Coverage of food consumption assessment in children participating in the Healthy Growth Program - Brazil, 2015-2018

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Abstract *This study aimed to compare the prevalence of food consumption assessment coverage in children under 10 years old before and after the implementation of the Healthy Growth Program (HGP). In this sense, a cross-sectional study was conducted using data from 548 municipalities registered in the HGP and available in the Food and Nutritional Surveillance System of the Brazilian Ministry of Health. The food consumption assessment coverage indicator was analyzed per geographic regions, a Chi-square test was performed and the Prevalence Ratios (PR) and their respective 95% confidence intervals (95% CI) were estimated. Food consumption assessment coverage increased from 0.25% in 2015 to 1.78% in 2018 (PR=7.09; 95%CI 7.00;7.18). The Southern region showed the highest and the Midwestern region the lowest increase in food consumption coverage. Although food consumption assessment coverage has increased less than the five-percent target set by the HGP, there has been an improvement in monitoring the nutritional status of children, which requires developing actions that support mapping the food and nutritional scenario of children in Brazil.*
Key words *Health Services Coverage, Food and Nutritional Surveillance, Food Consumption, Children*

Introduction

Monitoring food consumption is an indispensable process in child development. If it is neglected, it may contribute to the occurrence of childhood obesity, which is usually related to lifestyle, cultural, demographic and genetic factors, as well as to hormonal disorders. Child obesity, in turn, should be addressed by public policies, including those aimed at the school environment, which may play a fundamental role in the promotion of health, physical activity, as well as food and nutritional education[1].

A wide range of recommendations is available to develop plans that aim to reverse that issue and control the epidemic of childhood obesity. In Brazil, plans to fight child obesity and to define common goals were formalized by the main management instruments of the Public Health System (SUS), together with other intersectoral plans, such as the National Plan for Food and Nutritional Safety and the Intersectoral Strategy for the Prevention and Control of Obesity[2].

Monitoring food consumption markers by means of the Food and Nutritional Surveillance System (SISVAN) is a tool used to support nutritional care which helps identifying gaps and opportunities to promote adequate and healthy nutrition in individual and collective contexts[3,4].

The General Coordination of Food and Nutrition (CGAN) has made food consumption markers forms available in SISVAN since 2008, which allows to assess the food consumption of the Brazilian population at Primary Care (PC) level to encourage all PC team professionals to assess food consumption. In 2013, CGAN performed a review process and presented a proposal for a quick food consumption assessment aimed at people of any age or stage of life[3]. In 2015, a new revision of the assessment module of food consumption markers was incorporated into SISVAN, which allowed assessing more up-to-date breastfeeding practices[5] by PC users.

In 2007, a partnership between the Ministry of Health and the Ministry of Education launched the Health at School Program (HSP) that also supports actions against childhood obesity by encouraging the integral development of students. School communities are thus invited to join programs and projects that address vulnerabilities – such as obesity – that hamper the full development of Brazilian children, adolescents and young people[6].

Based on the understanding that the promotion of adequate and healthy nutrition and childhood obesity prevention, which is part of the HSP action list, should include more than holding lectures, roundtable talks and delivering folders that describe the ten steps of healthy eating or diets, the Ministry of Health additionally launched the Healthy Growth Program (HGP) in 2017. It aims to support municipal management with measures that focus on improving food consumption and the practice of physical activity by means of actions aimed at the promotion, protection, diagnosis and treatment of obesity, which also supports the integrated and multidisciplinary care of schoolchildren participating in the HSP[3,4].

In this context of actions that address both health and education, the HGP seeks to contribute to the control of childhood obesity in Brazil by means of initiatives that are part of the HSP and are aimed at children under 10 years old who are enrolled in Early Childhood Education (daycare centers and preschools) and Elementary School I[7].

To participate in the HGP, municipalities are prioritized according to criteria that include larger population, greater coverage of food and nutritional surveillance and greater prevalence of overweight in children under 10 years old. Selected municipalities receive financial resources in the form of an extra budget to organize actions that address childhood obesity. The goal of the HGP in terms of food consumption is 5% of children under 10 years old with a food consumption monitoring record in SISVAN, according to results registered every two years, cycle 2017/2018[2].

Knowing that childhood obesity, as a health problem related to food consumption, has already been addressed by other actions, such as the HSP, the difference of this study lies in that it analyzes assessment coverage before (2015/2016) and after the implementation of the HGP (2017/2018), which is still little investigated in the current nutritional scenario.

In view of the above, this study aimed to compare the prevalence of food consumption assessment coverage in children under 10 years old before and after the implementation of the Healthy Growth Program (HGP).

Methods

A cross-sectional study was performed using HGP data found on SISVAN Web, The Ministry of Health and the public monitoring report of the HGP.

Data from the 548 municipalities participating in the HGP were selected, whose indicators of the first HGP cycle (2017/2018) were compared with the 2015/2016 indicators (before the HGP), registered on SISVAN Web. This analysis was also performed by Brazilian macro-regions.

Despite the fact that the HGP presented other indicators related to nutritional status and actions to promote nutrition and physical practices, this study focused on the food consumption assessment coverage indicator. This indicator was calculated by dividing the number of children under 10 years old with a food consumption assessment record (numerator) by the number of children under 10 years old residing in the municipalities of the HGP (denominator), multiplied by 100. To estimate the population of children under 10 years old, we used an intercensal projection based on 2012 that was extracted from the Department of informatics of the Brazilian Unified Health System (DATASUS), since it contained the most updated, detailed and stratified age by region.

Food consumption assessment coverage was performed by means of the Chi-square test with $p<0.05$, and by means of the Prevalence Ratio (PR) and its respective 95% confidence intervals (95%CI). Statistical package Stata version 14.0 was used[8].

This study used secondary publicly available data (available at: http://nutricao.saude.gov.br/ sisvan/relatorios_publicos/) that did not identify the participants of the research so no approval by the Research Ethics Committee (REC) was required.

Results

Table 1 presents the consolidated food consumption record monitoring indicators of the municipalities that participated in the HGP, comparing the years 2015 and 2018. Records of food consumption of children under 10 years old increased more than seven times in that period of time.

The number of municipalities that reached the goal established by the HGP, i.e., at least 5% of food consumption assessment coverage in children under 10 years old increased from 12 to 133 municipalities, i.e., 24.27% reached the goal. In addition, there was a significant reduction of 64.4% in the percentage of municipalities that had no food consumption records of children under 10 years old, a decrease from 368 to 131 municipalities (Table 1).

Coverage of food consumption assessment in children under 10 years varied throughout the study period. In 2015/2016, there was an increase from 0.25% to 0.67%, in 2016/2017 a decrease from 0.67% to 0.65% and in 2017/2018 an increase from 0.65% to 1.78%. The highest production of records on food consumption in SISVAN (Table 2) occurred in 2018.

Food consumption assessment coverage of municipalities that took part in the HGP increased by 2.68 times in 2015/2016, but it decreased by around 3% in 2016/2017. In 2018, coverage was twice as high as in 2017 (Table 2).

In 2015/2016, the Midwestern and Southern regions showed an increase in percentages of food consumption assessment coverage in children under 10 years old. Percentages were 0.42% and 0.30% followed by 1.17% and 0.81%, respectively. In 2017, the Southeastern region reached almost a 1% coverage rate, the highest increase in the number of food consumption records. In 2018, highlights included the Southern region with 3.15% and the Northeastern region with 1.97% (Table 2). No region achieved the goal set by the program.

The Northern region was used as a reference because it showed the lowest food consumption assessment coverage percentages. In 2015, except for the Northeastern region (1.05% [95%CI 0.97;1.10]), which showed similar results as the Northern region, all other regions showed significantly higher food consumption assessment coverage (Table 3). The highest increase in food consumption assessment coverage was found in the Midwestern region (2015 and 2016), in the Southeastern region (2017), and in the Southern and Northeastern regions (2018). In 2018, the Midwestern region showed a significant decrease in food consumption assessment coverage in comparison to the years investigated (0.96% [95%CI 0.92;0.99]), which is the only region with lower coverage percentages than the Northern region during that period of time (Table 3).

Between 2015 and 2018, the Northern region increased food consumption coverage 4.85 times, while the Northeastern region increased it 9.38 times and the Southeastern region 5.52 times. The Southern Region showed the largest increase (10.05 times) and the Midwestern region the smallest one (2.21 times) (Table 3).

The states with the highest food consumption assessment coverage were Tocantins (2015); Tocantins, Piauí, Mato Grosso do Sul, Paraná and Minas Gerais (2016); Tocantins, Amapá, Minas Gerais, Mato Grosso do Sul and Santa Catarina

(2017); Tocantins, Pará, Maranhão, Piauí, Ceará, Paraíba, Pernambuco, Alagoas, Sergipe, Bahia, Minas Gerais, Mato Grosso do Sul, São Paulo, Paraná, Santa Catarina and Rio Grande do Sul (2018) (Figure 1).

Discussion

Despite the progress obtained due to food consumption coverage in SISVAN, the goal of having 5% of children under 10 years old with a monitoring record was not reached in any region of Brazil. The Northern region showed the lowest percentage, while the Southern and Southeastern region showed the highest percentages. In addition, there was a significant decrease in the number of municipalities without food consumption records of children under 10 years old.

Causes of poor food consumption coverage are related to the management of the system as a whole, especially the physical infrastructure, the lack of credibility of information, constant changes in technical staff, lack of communication and co-operation among the different government levels, lack of understanding the system by users, education and training of health care professionals regarding the monitoring of food consumption indicators and a the need of stronger incentive for data collection[3,9,10].

In general, Health Information Systems (HIS) have been underutilized in their potential to instrumentalize decision-making by managers, as was observed in relation to SISVAN. In 2016, a

Table 1. Indicators for monitoring the record of food consumption under the Healthy Growth Program. Brazil, 2015 and 2018.

Indicators	2015		2018*		PR (95%CI)	p-value
	N	%	N	%		
Food consumption record coverage in children under 10 years old (goal: 5%)**	26,584	0.25	185,754	1.78	7.09 (7.00;7.18)	<0.001
Municipalities that own food consumption records of children under 10 years old***	12	2.18	133	24.27	11.33 (6.27;20.47)	<0.001
Municipalities lacking food consumption records of children under 10 years old***	368	67.15	131	23.90	0.34 (0.27;0.41)	<0.001

*End of the 1st Cycle 2017/2018 of the HGP. **In relation to the estimated population of children under 10 years old (N=10,431,768). ***In relation to the total number of municipalities that participated in the HGP (N=548).

Source: Healthy Growth Monitoring Report, 2019.

Table 2. Food consumption assessment coverage in children under 10 years old in the municipalities that took part in the Healthy Growth Program per macro-regions. Brazil, 2015-2018.

Macro-region	Projection of the population of children under 10 years old (2012)	Before the HGP		During the HGP	
		2015	2016	2017	2018
		n (%)*	n (%)	n (%)	n (%)
Northeast	4,007,632	8,368 (0.20)	21,152 (0.53)	14,444 (0.36)	78,941 (1.97)
North	497,706	1,005 (0.21)	1,021 (0.21)	1,466 (0.29)	4,823 (0.97)
Southeast	3,809,219	8,928 (0.23)	24,362 (0.64)	37,629 (0.99)	48,306 (1.27)
South	1,159,196	3,430 (0.30)	9,357 (0.81)	7,395 (0.64)	36,529 (3.15)
Midwest	889,075	3,695 (0.42)	10,395 (1.17)	5,536 (0.62)	8,277 (0.93)
HGP Municipalities	10,431,768	26,584 (0.25)	70,100 (0.67)	67,781 (0.65)	185,754 (1.78)

*Coverage (%): (Total children under 10 years old with food consumption records in SISVAN per year/Total children under 10 years old residing in the municipality in 2012) X 100.

Source: Healthy Growth Monitoring Report, 2019.

Table 3. Prevalence of food consumption assessment coverage among children under 10 years old per macro-regions. Brazil. 2015-2018.

Macro-region	2015			2016			2017			2018			PR 2018/2015
	%	PR* (95%CI)	p-value	%	PR* (95%CI)	p-value	%	PR* (95%CI)	p-value	%	PR* (95%CI)	p-value	
North	0.20	1.00		0.21	1.00		0.29	1.00		0.97	1.00		4.85
Northeast	0.21	1.05 (0.97;1.10)	0.3154	0.53	2.52 (2.42;2.75)	<0.001	0.36	1.24 (1.16;1.29)	<0.001	1.97	2.03 (1.99;2.12)	<0.001	9.38
Southeast	0.23	1.15 (1.08;1.24)	<0.001	0.64	3.05 (2.94;3.34)	<0.001	0.99	3.41 (3.20;3.56)	<0.001	1.27	1.31 (1.27;1.35)	<0.001	5.52
South	0.30	1.50 (1.36;1.57)	<0.001	0.81	3.86 (3.71;4.22)	<0.001	0.64	2.21 (2.05;2.30)	<0.001	3.15	3.25 (3.22;3.42)	<0.001	10.05
Midwest	0.42	2.10 (1.92;2.21)	<0.001	1.17	5.57 (5.39;6.14)	<0.001	0.62	2.14 (2.03;2.28)	<0.001	0.93	0.96 (0.92;0.99)	0.02	2.21

* PR: Prevalence Ratio.

Source: Healthy Growth Monitoring Report, 2019.

study on Brazilian states and capitals showed that despite the geographical progress of the implementation of SISVAN in Brazilian municipalities, the system was not used as expected by the Federal Government[11], which makes it difficult to increase and consolidate data extraction.

The understanding and analysis of food consumption through HIS are the starting points to explore the records, but measures need to be developed that go beyond the biological aspects and cover both the individual and the community to develop health policies that consider and understand the overall needs of the population[12].

A reduced focus on follow-up and intervention in cases of children with food deficit or excessive consumption by HIS has given rise to concern in several countries, since overweight in childhood is directly associated with chronic diseases, such as coronary heart disease, hypertension and diabetes. In addition, studies show that this kind of deficits in early years of life may cause permanent handicaps in health, education and economy of future generations[13,14].

To make countries aware of the need to tackle all forms of unhealthy food consumption, considering its multiple causes such as under-nutrition, micronutrient deficiencies, overweight and obesity, the United Nations' Food and Agriculture Organization (FAO) and the World Health Organization (WHO) have announced the UN Decade of Action on Nutrition that lasts from 2016 to 2025[15]. Brazil was a leader in these discussions and the first country to make commitments in the context of the decade to reduce the consumption of unhealthy foods[12].

In 2010, all Brazilian municipalities showed individuals of all age groups (including pregnant women) registered in SISVAN Web. However, only 22.4% of the municipalities included at least one food consumption record in the system that same year, with a predominance of children under 10 years old and pregnant women, although these groups showed low consumption monitoring coverage. This is caused by system failures, since the system was built on the basis of monitoring nutritional status indicators and growth conditions to tackle nutritional deficiencies, as well as on *Bolsa Família*, without prioritizing the corresponding food consumption assessment[3].

In the present study, the highest frequencies and variations in food consumption coverage are found in the first years (2015-2016) of the Midwest Region. In the Northern region, which shows the lowest coverage of all regions, the state of Tocantins showed the strongest development.
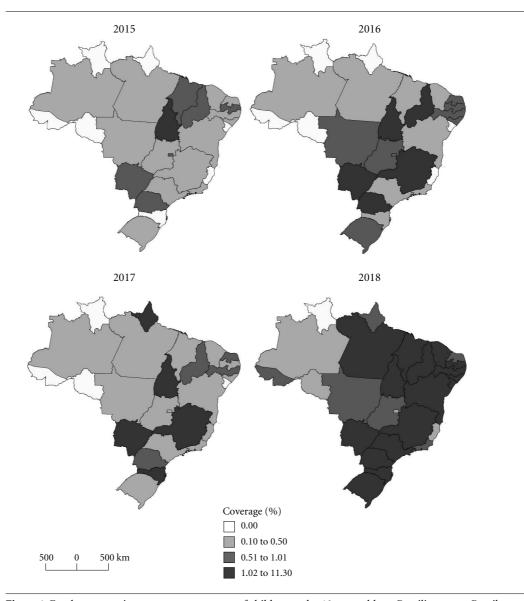
2015

2016

2017

2018

Coverage (%)
- 0.00
- 0.10 to 0.50
- 0.51 to 1.01
- 1.02 to 11.30

500   0   500 km

Figure 1. Food consumption assessment coverage of children under 10 years old per Brazilian states. Brazil, 2015-2018.

Source: Healthy Growth Monitoring Report, 2019.

Tocantins is number one among the states of that region, showing constancy of results when compared to the study performed in 2012 in which this state presented the highest coverage of Brazil (2.1%)[3,16].

Other reasons why the municipalities were unable to achieve the general goal of food consumption in the regions over the years are also related to the lack of control of errors and inconsistencies in collecting and typing data[2,3]. The low quality of food consumption data at national level and the difficulty in analyzing and interpreting them discourages interventions aimed at improving food consumption records in the different regions of Brazil[11], resulting in a decrease in coverage percentages.

Another study that evaluated SISVAN found that efforts focus rather on recording weight and height data, as only one third of the people in charge of operating the system were actually recording food consumption. This is mainly due to the lack of training and updating of these pro-

fessionals in collecting, recording and extracting data properly[9,13]. Training focuses on the evaluation of the nutritional status[3], rather than on the need for and importance of recording markers of food consumption, which makes it difficult to monitor and analyze indicators.

On the other hand, an increase in total coverage during the 2017/2018 cycle was noticed after the establishment of goals and financial benefit conditioned to the inclusion into the HGP[2]. This conditioning aimed to leverage recording of food consumption, considering the importance of exploring the children's dietary state to define intervention strategies that are closer to the reality of the child obesity issue.

Although only 133 municipalities reached the five-percent target of children under 10 years old with a food consumption monitoring record in SISVAN, as established by the HGP for the 2015-2018 period, recorded data increased, nonetheless. That information provides a better analytical capacity of food consumption markers, which favors the recognition of the population's food scenario and improves the ability to intervene on commonly identified issues[4].

Although monitoring of the nutritional situation of children increased, due to expanded coverage of food consumption, pressure needs to be maintained on municipalities, states and regions so that they keep up food and nutritional surveillance of that public.

The Southern and the Northeastern region stand out among the regions with the highest increase in food consumption coverage in 2015-2018. The increase in coverage identified in these regions over the years analyzed reflects the improvement in the indicators of this guideline regarding nutritional care in children under 10 years old. A study that investigated the coverage of food consumption in Brazilian regions between 2008 and 2013 showed that both the Northeast and Southeast presented a statistically significant increasing trend of regional coverage[3], which may be associated with greater investments in Food and Nutrition Surveillance (FNS).

The lower food consumption assessment coverage in the Northern region may be caused by key cultural and geographical features, which may slow down progress and consolidation of records, such as territorial features, e.g. the Amazon rainforest, that hamper human occupation

and access to several places. The cultural diversity and the large number of Indigenous and riverside communities also challenge the dialogue with these populations, especially with managers and technicians as they understand the health-disease process, priorities and work methods that need to be prioritized in a different way, especially in health care[16,17].

Results presented by this study need to be interpreted with caution and the use of secondary data needs to be taken into account, since there may be inconsistencies regarding data quantity and quality and underreporting of children monitored by primary care. In addition, results do not allow inferences at individual level since this is a study of aggregates with analyses by regions. Another limitation is that HGP municipalities had only one year to implement actions to prevent and control childhood obesity in the first cycle (2017/2018), which may have contributed to low increase in food consumption assessment coverage.

Conclusion

The HGP did increase SISVAN's coverage of food consumption of children under 10, despite the fact that it did not reach its full goal in any Brazilian region. That increase suggests a better monitoring of the nutritional situation of children under 10 years old and results show an increase in total coverage. Therefore, efforts should be strengthened so that municipalities and states continue to perform food and nutritional surveillance in children.

If the Southern and Midwestern regions showed the highest increase in food consumption coverage over the years, the Northern region consistently showed the lowest increase, which points out that Public Strategies are needed to reduce structural and access issues caused by geographical features to better solve issues related to food consumption records.

Since no studies on topics related to the HGP are available, program goals need to be continuously and systematically monitored and its strategies reinforced to optimize mapping of the food and nutritional scenario of children, especially by improving the HIS in the face of the nutritional transition observed in recent decades.

Collaborations

LKS Borges was in charge of the study, study design, analysis and writing of the manuscript. FF Nascimento participated in study design, revision and writing of the manuscript. MDM Mascarenhas participated in study design, review and writing of the manuscript. MTP Rodrigues participated in study design, revision and writing of the manuscript.

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